Hidrasyon Stratejileri: Sıvı ve Elektrolit Dengesi ile Performansı Artırmak

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SUNUM AKIŞI

- Sıvı alımının önemi
- Hidrasyonla ilgili tanımlar
- Hidrasyonun performans üzerine etkileri
- Elektrolitlerin performans üzerine etkileri

Vücut sıvı dengesinin sağlanması

Sağlık için önemli

Spor performansı !!!

Vücut sıvı dengesinin sağlanması

Kan/plazma osmolalitesi

Ekstraselüler sıvı hacmi

Reseptör (hipotalamus)

Hormon (pituiter bez)

Sıvı tüketim

Sıvı atımı

Vücut sıvı dengesinin sağlanması

Kan/plazma osmolalitesi

Ekstraselüler sıvı hacmi

Reseptör (hipotalamus)

Hormo

S

Physiology & Behavior 268 (2023) 114227

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Physiology & Behavior

journal homepage: www.elsevier.com/locate/physbeh

Ad-libitum fluid intake was insufficient to achieve euhydration 20 h after intermittent running in male team sports athletes

Mark P. Funnell *, Loris A. Juett, Robert Ferrara, Stephen A. Mears, Lewis J. James

National Centre for Sport, Exercise & Medicine, Loughborough University, Leicestershire, LE11 3TU, UK

VÜCUT SIVI DENGESİ

Yiyecek	İdrar
İçecek	Deri/Ter
Metabolizma sonucu oluşan su	Gaita
	Akciğerler/Solunum

VÜCUT SIVI DENGESİ

Egzersiz durumunda

Terleme ile kayıplar (*istenen* ve *istem dışı*)

Diüretik kullanımı

İdrar

Deri/Ter

Gaita

Akciğerler/Solunum

Dehidrasyon

Hücre içi ve hücre dışı sıvı kaybının yaşanması

İzotonik

Su kaybı = Elektrolit kaybı

Hipertonik

Su kaybı > Elektrolit kaybı

Hipotonik

Su kaybı < Elektrolit kaybı

Dehidrasyon

Hücre içi ve hücre dışı sıvı kaybının yaşanması

İzotonik — Diüretikler

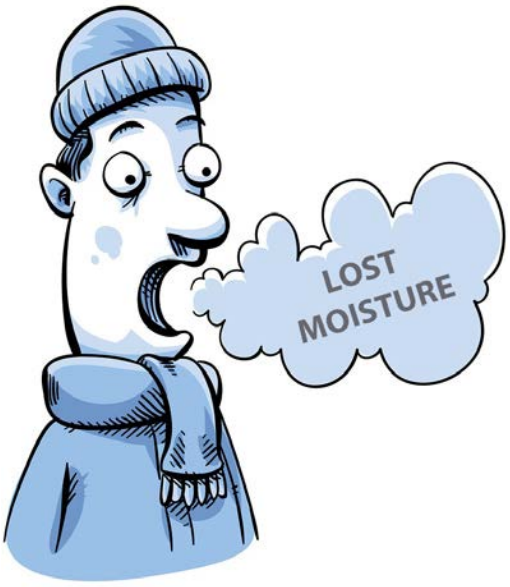
Su kaybı = Elektrolit kaybı

Hipertonik — Terleme

Su kaybı > Elektrolit kaybı

Hipotonik

Su kaybı < Elektrolit kaybı



Dehidrasyon

- ↓ Kan hacmi
- ↑ Kalp atım hızı
- ↑ Vücut sıcaklığı

Enzim fonksiyonları etkilenir

Dehidrasyon nedenleri

- Sıcaklık *(pasif dehidrasyon)*
- Sıcaklık + egzersiz *(aktif dehidrasyon)*
- Sıvı kısıtlaması *(pasif dehidrasyon)*

<u>Antrene</u> olamayan bireyler daha riskli

- Aerobik antrene
- Anaerobik antrene

Cinsiyet (Menstrual siklus)
Sporcunun vücut sıcaklığı
Enerji sınırlaması

Dayanıklılık sporlarında durum

- Kasa giden kan akışının azalması
- Doku oksijenlenmesinin düşmesi
- Mitokondrial enerji üretiminin azalması (oksidatif fosforilasyon)

Karbonhidrat kullanımı etkilenir

Erken laktat üretimine neden olur ➡ YORGUNLUK

Özellikle sıcak hava koşullarında;

Vücut ağırlığının %6-10'luk kaybının olduğu durumlarda

Egzersize tolerans düşmekte

Kardiyak atım ⬇

Terleme hızı ⬇

Cilt ve kasa ulaşan kan miktarı ⬇

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Influence of diuretic-induced dehydration on competitive running performance

LAWRENCE E. ARMSTRONG, DAVID L. COSTILL, and WILLIAM J. FINK

Vücut ağırlığının %2 kaybı sağlanarak dehidrate edilmiş

1500 m, 5000 m, 10000 m koşu performansları ölçülmüş

TABLE 3. Running performance times recorded on the outdoor 400-m track.

	Trial Time (min)					
	1500 m		5000 m		10,000 m	
Subjects	H	D	H	D	H	D
A	4.50	4.45	16.23	16.77	33.48	34.60
B	4.92	5.43	19.05	20.30	41.87	42.40
Mean	4.71	4.87	18.22*	19.53	38.87*	41.49
±SE	±0.16	±0.51	±0.85	±0.93	±1.73	±1.73

† ΔPV did not meet dehydration criterion (−2%).
* Significantly different from D trial ($P < 0.05$).

Koşu zamanı

0.13, 1.31, 2.6 dk gecikmiş

Sports Med (2015) 45:1207–1227
DOI 10.1007/s40279-015-0349-0

SYSTEMATIC REVIEW

Effect of Hypohydration on Muscle Endurance, Strength, Anaerobic Power and Capacity and Vertical Jumping Ability: A Meta-Analysis

Félix-Antoine Savoie[1,2] · Robert W. Kenefick[3] · Brett R. Ely[3,4] · Samuel N. Cheuvront[3] · Eric D. B. Goulet[1,2]

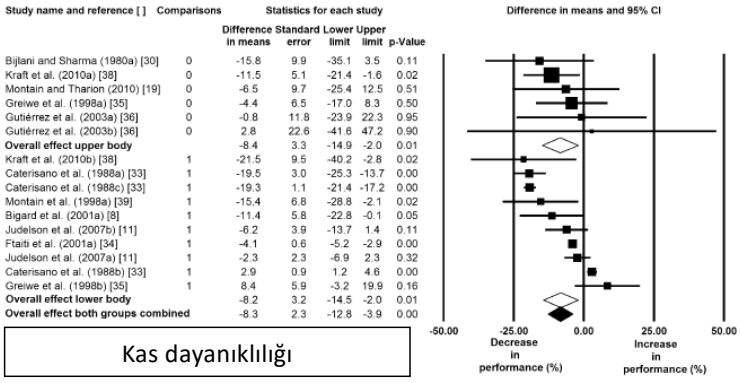
Kas performansı

Dayanıklılık

Güç

Anaerobik güç

Anaerobik kapasite??? (p>0.05)



Kas dayanıklılığı

Vücut ağırlığının %3'lük kaybı

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SYSTEMATIC REVIEW

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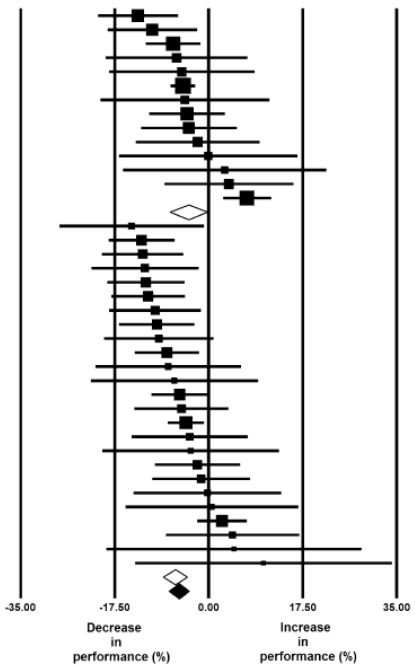
Anaerobic Power and Capacity and Vertical Jumping A
A Meta-Analysis

Félix-Antoine Savoie[1,2] · Robert W. Kenefick[3] · Brett R. Ely[3,4] · Samuel N. Cheuvront[3] · Eric D. B. Goulet[1,2]

Study name and reference [ ]	Comparisons	Difference in means	Standard error	Lower limit	Upper limit	p-Value
Bijlani and Sharma (1980a) [30]	0	-15.8	9.9	-35.1	3.5	0.11
Kraft et al. (2010a) [38]	0	-11.5	5.1	-21.4	-1.6	0.02
Montain and Tharion (2010) [19]	0	-6.5	9.7	-25.4	12.5	0.51
Greiwe et al. (1998a) [35]	0	-4.4	6.5	-17.0	8.3	0.50
Gutiérrez et al. (2003a) [36]	0	-0.8	11.8	-23.9	22.3	0.95
Gutiérrez et al. (2003b) [36]	0	2.8	22.6	-41.6	47.2	0.90
Overall effect upper body		-8.4	3.3	-14.9	-2.0	0.01
Kraft et al. (2010b) [38]	1	-21.5	9.5	-40.2	-2.8	0.02
Caterisano et al. (1988a) [33]	1	-19.5	3.0	-25.3	-13.7	0.00
Caterisano et al. (1988c) [33]	1	-19.3	1.1	-21.4	-17.2	0.00
Montain et al. (1998a) [39]	1	-15.4	6.8	-28.8	-2.1	0.02
Bigard et al. (2001a) [8]	1	-11.4	5.8	-22.8	-0.1	0.05
Judelson et al. (2007b) [11]	1	-6.2	3.9	-13.7	1.4	0.11
Ftaiti et al. (2001a) [34]	1	-4.1	0.6	-5.2	-2.9	0.00
Judelson et al. (2007a) [11]	1	-2.3	2.3	-6.9	2.3	0.32
Caterisano et al. (1988b) [33]	1	2.9	0.9	1.2	4.6	0.00
Greiwe et al. (1998b) [35]	1	8.4	5.9	-3.2	19.9	0.16
Overall effect lower body		-8.2	3.2	-14.5	-2.0	0.01
Overall effect both groups combined		-8.3	2.3	-12.8	-3.9	0.00

Kas dayanıklılığı

Study name and reference [ ]	Comparisons	Difference in means	Standard error	Lower limit	Upper limit	p-Value
Wilson et al. (2013a) [45]	0	-13.2	3.8	-20.6	-5.8	0.00
Bosco et al. (1968c) [32]	0	-10.5	4.2	-18.8	-2.2	0.01
Webster et al. (1990a) [12]	0	-6.6	2.6	-11.7	-1.6	0.01
Bijlani and Sharma (1980b) [30]	0	-6.0	6.7	-19.1	7.1	0.37
Bosco et al. (1974a) [31]	0	-5.0	6.9	-18.5	8.5	0.47
Schoffstall et al. (2001) [42]	0	-4.8	1.1	-7.0	-2.6	0.00
Bosco et al. (1968a) [32]	0	-4.4	8.0	-20.1	11.2	0.58
Gutiérrez et al. (2003c) [36]	0	-4.0	3.6	-11.0	2.9	0.26
Gutiérrez et al. (2003d) [36]	0	-3.7	4.5	-12.5	5.1	0.41
Bosco et al. (1968b) [32]	0	-2.0	5.8	-13.5	9.4	0.73
Périard et al. (2012b) [41]	0	-0.1	8.4	-16.7	16.4	0.99
Périard et al. (2012a) [41]	0	3.0	9.6	-15.9	21.9	0.76
Greiwe et al. (1998c) [35]	0	3.8	6.1	-8.2	15.7	0.54
Evetovich et al. (2002a) [7]	0	7.1	2.3	2.7	11.5	0.00
Overall effect upper body		-3.7	1.8	-7.2	-0.2	0.04
Bosco et al. (1974b) [31]	1	-14.3	6.8	-27.7	-0.9	0.04
Ftaiti et al. (2001b) [34]	1	-12.5	3.1	-18.6	-6.4	0.00
Hayes and Morse (2010d) [25]	1	-12.3	3.8	-19.8	-4.8	0.00
Hayes and Morse (2010c) [25]	1	-11.9	5.1	-21.8	-2.0	0.02
Hayes and Morse (2010e) [25]	1	-11.7	3.6	-18.9	-4.6	0.00
Minshull and James (2013) [20]	1	-11.3	3.5	-18.0	-4.5	0.00
Hayes and Morse (2010b) [25]	1	-10.0	4.3	-18.5	-1.5	0.02
Bowtell et al. (2013) [18]	1	-9.7	3.6	-16.6	-2.7	0.01
Périard et al. (2012c) [41]	1	-9.3	5.2	-19.4	0.8	0.07
Viitasalo et al. (1987a) [44]	1	-7.8	3.0	-13.7	-1.9	0.01
Viitasalo et al. (1987b) [44]	1	-7.6	6.9	-21.0	5.9	0.27
Bosco et al. (1968d) [32]	1	-6.4	7.9	-21.9	9.2	0.42
Del Coso et al. (2008) [24]	1	-5.4	2.7	-10.6	-0.2	0.04
Hayes and Morse (2010a) [25]	1	-5.1	4.4	-13.8	3.6	0.25
Wilson et al. (2013b) [45]	1	-4.2	1.7	-7.6	-0.9	0.01
Périard et al. (2012d) [41]	1	-3.6	5.5	-14.3	7.2	0.52
Bosco et al. (1968f) [32]	1	-3.4	8.4	-19.8	13.0	0.69
Judelson et al. (2007c) [11]	1	-2.1	4.0	-10.0	5.8	0.60
Bigard et al. (2001b) [8]	1	-1.4	4.6	-10.5	7.7	0.76
Stewart et al. (2014) [43]	1	-0.2	7.0	-13.9	13.5	0.98
Bosco et al. (1968e) [32]	1	0.6	8.2	-15.4	16.6	0.94
Judelson et al. (2007d) [11]	1	2.5	2.3	-2.1	7.0	0.28
Montain et al. (1998b) [39]	1	4.5	6.3	-7.9	16.8	0.48
Greiwe et al. (1998d) [35]	1	4.7	12.1	-19.0	28.4	0.70
Webster et al. (1990b) [12]	1	10.2	12.2	-13.7	34.0	0.40
Overall effect lower body		-6.2	1.1	-8.4	-4.0	0.00
Overall effect both groups combined		-5.5	1.0	-7.4	-3.6	0.00



Kas gücü

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Bosco et al. (1968c) [32]	0	-10.5	4.2	-18.8	-2.2	0.01
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Bosco et al. (1974a) [31]	0	-5.0	6.9	-18.5	8.5	0.47
Schoffstall et al. (2001) [42]	0	-4.8	1.1	-7.0	-2.6	0.00
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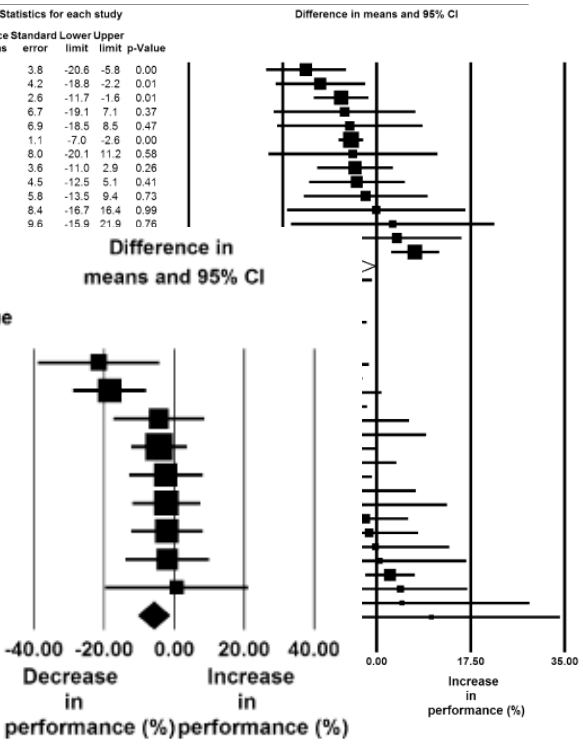
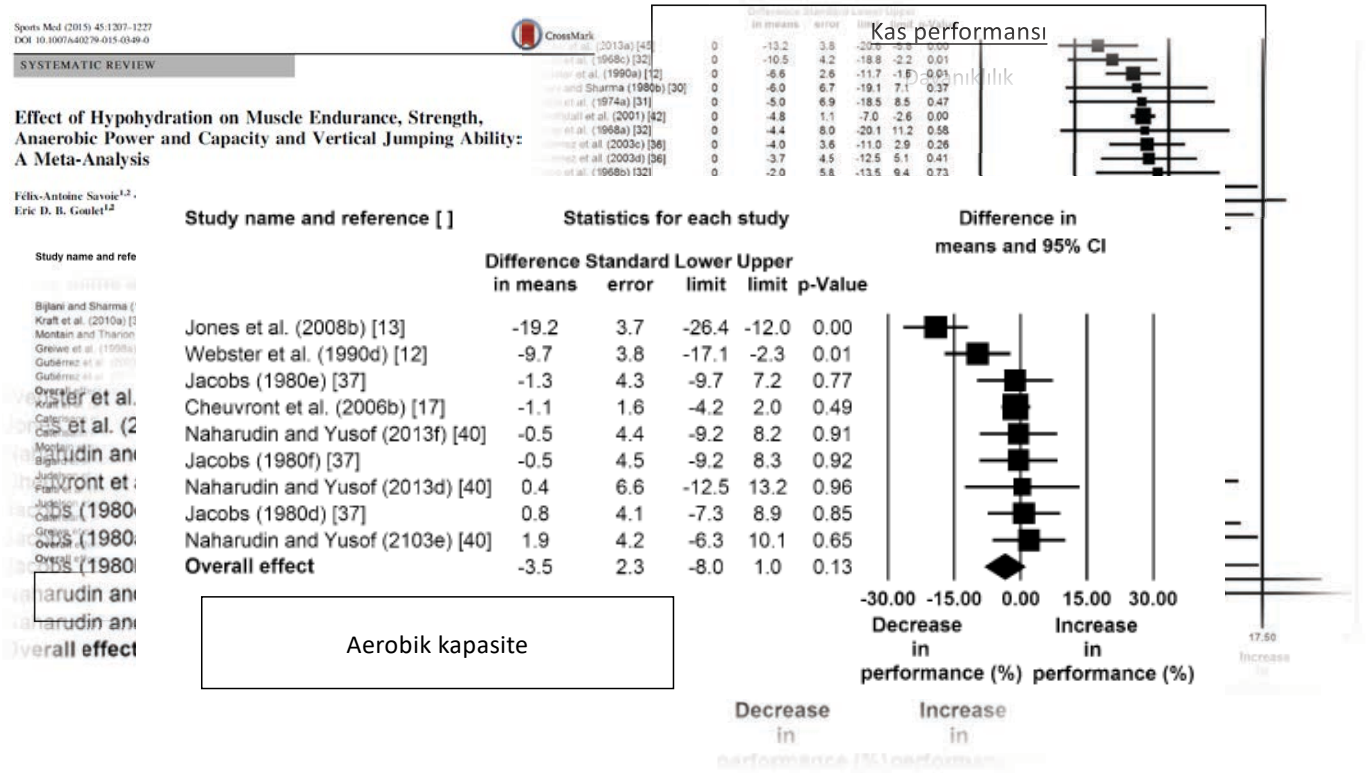
Gutiérrez et al. (2003d) [36]	0	-3.7	4.5	-12.5	5.1	0.41
Bosco et al. (1968b) [32]	0	-2.0	5.8	-13.5	9.4	0.73
Périard et al. (2012b) [41]	0	-0.1	8.4	-16.7	16.4	0.99
Périard et al. (2012a) [41]	0	3.0	9.6	-15.9	21.9	0.76

Study name and reference [ ]	Difference in means	Standard error	Lower limit	Upper limit	p-Value
Webster et al. (1990c) [12]	-21.5	8.8	-38.7	-4.3	0.01
Jones et al. (2008a) [13]	-18.4	5.3	-28.7	-8.1	0.00
Naharudin and Yusof (2013b) [40]	-4.3	6.6	-17.2	8.5	0.51
Cheuvront et al. (2006a) [17]	-4.3	4.0	-12.1	3.6	0.29
Jacobs (1980c) [37]	-2.3	5.3	-12.8	8.1	0.66
Jacobs (1980a) [37]	-2.2	4.9	-11.7	7.3	0.65
Jacobs (1980b) [37]	-2.1	5.2	-12.2	8.0	0.68
Naharudin and Yusof (2013c) [40]	-1.9	6.0	-13.7	9.8	0.75
Naharudin and Yusof (2013a) [40]	0.8	10.3	-19.5	21.0	0.94
Overall effect	-5.8	2.3	-10.3	-1.3	0.01



Aerobik güç



Kuvvet veya sıklet sporlarında durum

- Sıcak çevre (sauna, sıcak ortam veya buhar odası)
- Diüretik, emetik ve laksatif kullanımı
- Kendi kendini kusturma

- Kardiovasküler fonksiyon
- Elektrolit dengesi
- Renal fonksiyon
- Termal regülasyon
- Vücut kompozisyonu
- Kas dayanıklılığı ve gücü

Karbonhidrat kullanımı etkilenir

Erken laktat üretimine neden olur

©Journal of Sports Science and Medicine (2008) 7, 210-217
http://www.jssm.org

Research article

Acute effects of self-selected regimen of rapid body mass loss in combat sports athletes

Saima Timpmann, Vahur Ööpik ✉, Mati Pääsuke, Luule Medijainen and Jaan Ereline
Institute of Exercise Biology and Physiotherapy, Centre of Behavioural and Health Sciences, University of Tartu, Tartu, Estonia

3 gün içerisinde vücut ağırlığının %5.1'inin kayba uğratılıyor.

- Enerji ve sıvı alımı sınırlanıyor
- Orta derecede sauna uygulaması

Antrene dövüş sporcuları

- 3 dakikalık tekrarlı egzersizlerde kas performansının düştüğü

Hyperthermia and Dehydration-Related Deaths Associated With Intentional Rapid Weight Loss in Three Collegiate Wrestlers— North Carolina, Wisconsin, and Michigan, November-December 1997

MMWR. 1998;47:105-108

During November 7-December 9, 1997, three previously healthy collegiate wrestlers in different states died while each was engaged in a program of rapid weight loss to qualify for competition. In the hours preceding the official weigh-in, all three wrestlers engaged in a similar rapid weight-loss regimen that promoted dehydration through perspiration and resulted in hyperthermia. The wrestlers restricted food and fluid intake and attempted to maximize sweat losses by wearing vapor-impermeable suits under cotton warm-up suits and exercising vigorously in hot environments. This report summarizes the investigation of these three cases.

atinine results were unavailable. Anatomic findings from the autopsy were insufficient to determine the cause of death.

Case 2. On November 21, over a 4-hour period, a 22-year-old man in Wisconsin attempted to lose 4 lbs to compete in the 153-lb weight class of a wrestling tournament scheduled for November 22. His preseason weight on September 6 was 178 lbs. During the next 10 weeks he lost 21 lbs, of which 8 lbs were lost during November 17-20. On November 21 at 5:30 a.m., he initiated the same weight-loss regimen as in case 1. An hour later, he complained of shortness of breath but continued exercising. By 8:50 a.m., he had lost 3.5 lbs. He drank approximately 8 oz of wa-

p.m., he lost 2.3 lbs and weighed 156.7 lbs. After wrestling practice, he initiated the same weight-loss regimen as in case 1; after 75 minutes, he had lost an additional 2 lbs. After a 15-minute rest, he resumed exercise. Approximately 1 hour later, he stopped exercising to weigh himself and demonstrated fatigue. A few minutes later, his legs became unsteady, he became incommunicative, and he had difficulty breathing. Attempts to administer fluid orally were unsuccessful, and he developed cardiorespiratory arrest. Resuscitation was unsuccessful. Chemistry findings in vitreous humor obtained 4 hours after death were sodium, 159 mmol/L (normal: 136-146 mmol/L); urea nitrogen, 31

3 güreşçi (19-22 yaş arası)

- Daha önceden tanısı konmuş hastalığı bulunmayan
- Sezon öncesi (10 hafta) hızla vücut ağırlık kaybı yaşamış (%10 üzeri)
- Besin ve sıvı alımının sınırlandığı
- Terle sıvı kaybının desteklendiği uygulamalar sonucunda

Hipertermi kaynaklı kardiorespiratuar arest vakaları

Kan Sodyum
Ürenitrojen
Üremiyoglobin
Kreatinin

SONUÇ OLARAK; kısa süreli yüksek yoğunluktaki egzersiz performansı olumsuz etkilenir.

- Kısa süreli uygulama yapılacaksa vücut ağırlığının [illegible] kayba uğrayacağı şekilde düzenlenmesi g[illegible]

The Norwegian[illegible]

%3-4 ile sınırlanabileceği belirtilmiş

- Sıvı tüketimin yanı sıra besin alımının da sınırlı olmasının kas glikojen ve asit-baz dengesi üzerine etkili olabileceği belirtilmektedir.

Kardiovasküler fitness da etkilenmektedir

Dehidrasyonun etkisini artıran faktörler

- Sıvı alımının sınırlandırıldığı
- Enerji sınırlandırılması …

Toplam vücut sıvı miktarının azaltılmasına yönelik uygulamalar

- Dehidrasyondan bağımsız olarak kas ve iç sıcaklığın artması kas gücü ve kapasitesini azaltmaktadır.

- Nielsen B. et al, Scand J Sports Sci 1981.
- Cheung SS. Exerc Sport Sci Rev 2004.
- Thomas M. J Appl Physiol 2006.

ELEKTROLİTLER PERFORMANSI ETKİLER Mİ?

- Elektrolitler sıvı dengesi, kas fonksiyonları ve sinir iletimi için hayati öneme sahiptir.
- Dayanıklılık sporlarında ve enerji kullanımında etkilidir.
- Terleme ile kaybolduklarında mutlaka yerine konulmalıdır.

ELEKTROLİTLER

- Sadece suyla yerine konulamaz
- Sporcu içecekleri veya dengeli beslenme ile desteklenmelidir
- Elektrolit desteği performansı korur ve sakatlık riskini azaltır

Hiponatremi

Su kaybının fazla olduğu durumlarda

Yoğun terlemenin olduğu Na kaybının fazla olduğu durumlarda

Baş ağrısı

Kafa karışıklığı

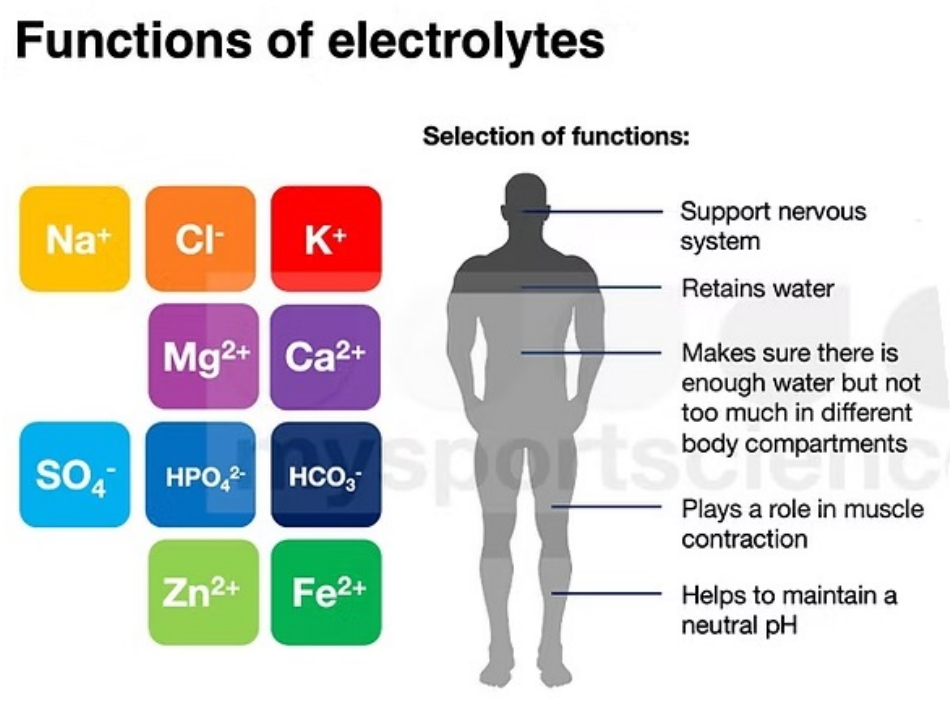
Kendini kötü hissetme

Mide bulantısı

Kramp

Ultra dayanıklılık sporcuları riskli grupta!!!

«6-8 saat'lik antrenmanlarda»



Enerji ve Besin ÖğeleriNutrition

Porsiyon başına miktar	100 ml için
Enerji	**73kJ/17kcal**
Yağ	0 g
Doymuş Yağ	0 g
Karbonhidrat	3,9 g
Şekerler	3,9 g
Protein	0 g
Tuz	0,12 g

Osmolalite: 286 +/- 5 mOsml/kg su.

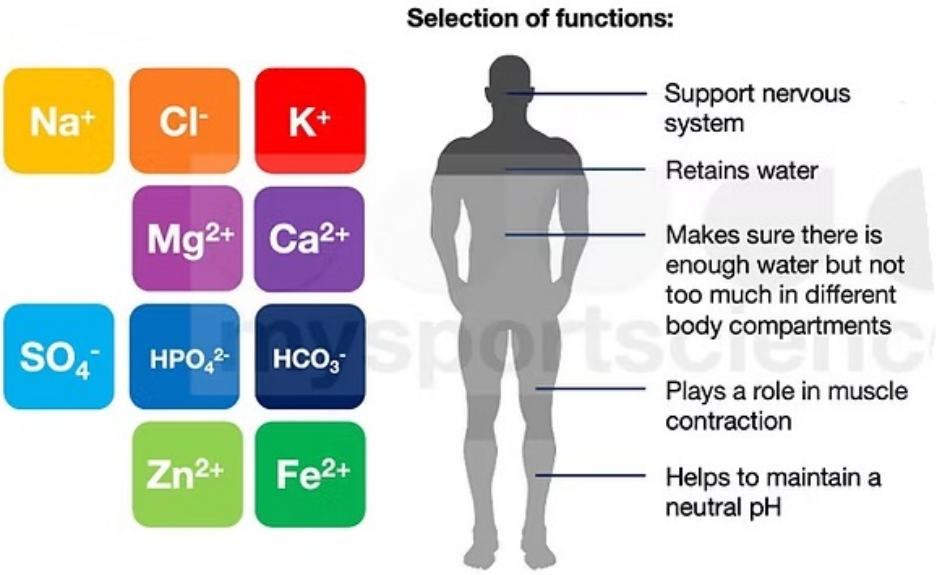
Elektrolit miktari (100 ml için): Sodyum: 50,0 mg, Potasyum: 12,5 mg, Kalsiyum: 1,3 mg, Magnezyum: 0,6 mg

Şekerler ve tatlandırıcılar içerir.

Servis Miktarı : ***30g (1,5 ölçek)***
Servis Sayısı : ***30***

1 Servis Üründe		**% Günlük Değer***
Enerji	95kcal	5%
Karbonhidrat	24,0g	9%
Şeker	15,0g	17%
Lif	0,0g	0%
Yağ	0,0g	0%
Doymuş Yağ	0,0g	0%
Protein	0,0g	0%
Tuz	630,0mg	10%
C Vitamini	80mg	100%
B1 Vitamini (Tiamin)	1,1mg	100%
B2 Vitamini (Riboflavin)	1,4mg	100%
B3 Vitamini (Niasin)	16,0mg	100%
B5 Vitamini (Pantotenik Asit)	6,0mg	100%
B6 Vitamini (Piridoksin)	1,4mg	100%
Elektrolit Karışımı		
Sodyum	250mg	10%
Klorür	152mg	19%
Magnezyum	140,0mg	37%
Kalsiyum	120mg	15%
Potasyum	85mg	4%
BCAA 4:1:1	250,0mg	**
L-Glutamin	205,0mg	**
L Karnitin	120mg	**

Functions of electrolytes



Journal of the International Society of Sports Nutrition

Home Articles

Table 2 Proposed Nutritional Ergogenic Aids – Minerals

From: ISSN Exercise & Sport Nutrition Review: Research & Recommendations

Potassium	2000 mg/d*	An electrolyte that helps regulate fluid balance, nerve transmission, and acid-base balance. Some suggest excessive increases or decreases in potassium may predispose athletes to cramping.	Although potassium loss during intense exercise in the heat has been anecdotally associated with muscle cramping, the etiology of cramping is unknown [372,373]. It is unclear whether potassium supplementation in athletes decreases the incidence of muscle cramping [374]. No ergogenic effects reported.

Potasyum; ergojen değil ancak kas kramplarını önler

Sodium	500 mg/d*		During the first several days of intense training in the heat, a greater amount of sodium is lost in sweat. Additionally, prolonged ultraendurance exercise may decrease sodium levels leading to hyponatremia. Increasing salt availability during heavy training in the heat has been shown to help maintain fluid balance and prevent hyponatremia [374,377].

Sodyum; yüksek yoğunluklu ultra dayanıklılık egzersizlerinde desteklenmeli

ÖNERİLER

«İlk öneri 1970'li yıllarda ACSM önerisi»

ACSM *(American College of Sports Medicine)*

SPECIAL COMMUNICATIONS

AMERICAN COLLEGE of SPORTS MEDICINE®

POSITION STAND

Exercise and Fluid Replacement

This pronouncement was written for the American College of Sports Medicine by Michael N. Sawka, FACSM (chair); Louise M. Burke, FACSM, E. Randy Eichner, FACSM, Ronald J. Maughan, FACSM, Scott J. Montain, FACSM, Nina S. Stachenfeld, FACSM.

SUMMARY

This Position Stand provides guidance on fluid replacement to sustain appropriate hydration of individuals performing physical activity. The goal of prehydrating is to start the activity euhydrated and with normal plasma electrolyte levels. Prehydrating with beverages, in addition to normal meals and fluid intake, should be initiated when needed at least several hours before the activity to enable fluid absorption and allow urine output to return to normal levels. The goal of drinking during exercise is to prevent excessive (>2% body weight loss from water deficit) dehydration and excessive changes in electrolyte balance to avert compromised performance. Because there is considerable variability in sweating rates and sweat electrolyte content between individuals, customized fluid replacement programs are recommended. Individual sweat rates can be

and the impact of their imbalances on exercise performance and health. This position statement replaces the prior Position Stand on exercise and fluid replacement published in 1996 (39). The new Position Stand includes a Strength of Recommendation Taxonomy (SORT) to document the strength of evidence for each conclusion and recommendation (50). Table 1 provides a description of strength of evidence category employed, based on thequality, quantity and consistency of the evidence for each statement. Occasionally review papers have been cited, to reduce the number of references, which provide extensive documentation regarding supporting studies. Recommendations are

TABLE 6. American College of Sports Medicine exercise and fluid replacement Position Stand evidence statements.

Section Heading	Evidence Statement	Evidence Category
Fluid & Electrolyte Requirements	Exercise can elicit high sweat rates and substantial water and electrolyte losses during sustained exercise, particularly in warm-hot weather.	A
	There is considerable variability for water and electrolyte losses between individuals and between different activities.	A
	If sweat water and electrolyte losses are not replaced then the person will dehydrate.	A
Hydration Assessment	Individuals can monitor their hydration status by employing simple urine and body weight measurements.	B
	A person with a first morning USG $\leq$ 1.020 or UOsmol $\leq$ 700 mOsmol·kg^{-1} can be considered as euhydrated.	B
	Several days of first morning body weight values can be used to establish base-line body weights that represent euhydration.	B
	Body weight changes can reflect sweat losses during exercise and can be used to calculate individual fluid replacement needs for specific exercise and environmental conditions.	A
Hydration Effects	Dehydration increases physiologic strain and perceived effort to perform the same exercise task, and is accentuated in warm-hot weather.	A
	Dehydration (>2% BW) can degrade aerobic exercise performance, especially in warm-hot weather.	A
	The greater the dehydration level the greater the physiologic strain and aerobic exercise performance decrement.	B
	Dehydration (>2% BW) might degrade mental / cognitive performance.	B
	Dehydration (3% BW) has marginal influence on degrading aerobic exercise performance when cold stress is present.	B
	Dehydration (3–5% BW) does not degrade either anaerobic performance or muscular strength.	A & B
	The critical water deficit and magnitude of exercise performance degradation are related to the heat stress, exercise task, and the individual's unique biological characteristics.	C
	Hyperhydration can be achieved by several but has equivocal benefits and several disadvantages.	B
	Dehydration is a risk factor for both heat exhaustion and exertional heat stroke.	A & B
	Dehydration can increase the likelihood or severity of acute renal failure consequent to exertional rhabdomyolysis.	B
	Dehydration and sodium deficits are associated with skeletal muscle cramps.	C
	Symptomatic exercise-associated hyponatremia can occur in endurance events.	A
	Fluid consumption that exceeds sweating rate is the primary factor leading to exercise-associated hyponatremia.	A
	Large sweat sodium losses and small body weight (and total body water) can contribute to the exercise-associated hyponatremia.	B
Modifying Factors	Women generally have lower sweating rates than men.	A
	Sex differences in renal water and electrolyte retention are subtle and probably not of consequence.	C
	Women are at greater risk than men to develop exercise-associated symptomatic hyponatremia.	C
	Older adults have age related decreased thirst sensitivity when dehydrated making them slower to voluntarily reestablish euhydration.	A
	Older adults have age related slower renal responses to water and may be at greater risk for hyponatremia.	A & C
	Children have lower sweating rates than adults.	B
	Meal consumption promotes euhydration.	A
	Sweat electrolyte (sodium and potassium) losses should be fully replaced to reestablish euhydration.	A
	Caffeine consumption will not markedly alter daily urine output or hydration status.	B
	Alcohol consumption can increase urine output and delay full rehydration.	B

PRATİK ÖNERİLER

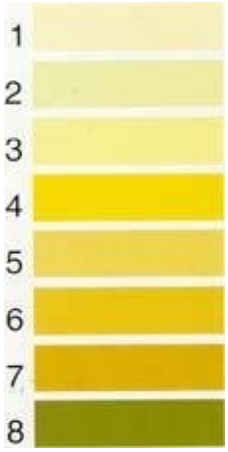
- Su
- Su içeriği yüksek besin tüketim önerisi
- Spor içecekleri-şekersiz olanları mevcut
- Kendi üreteceği içecek
- 1 lt ½ çay kaşığı tuz ve tatlandırıcılar

- Hindistan cevizi suyu (sodyum içeriği düşük, tuz eklenebilir?)
- Kafein
- Çikolatalı süt
- Pancar suyu
- Şalgam suyu

Hidrasyon durumunun değerlendirilmesi

- Empedans ve seyreltme tekniği
- Hematolojik göstergeler
- İdrar göstergeleri
- Vücut ağırlık değişimi
- Tükürük analizi

Armstrong idrar renk skalası



Terle kaybedilen elektrolit kaybının saptanması önem kazanmakta

- Sawka ve ark., 2007
- Coyle, 2004
- Vrijens & Rehrer,1999
- Shirreffs, Taylor, Leiper, & Maughan, 1996
- Kovacs, Schmahl, Denden ve Brouns, 2002
- Evans,Shirreffs ve Maughan, 2009a, 2009b